

Automatic Analysis of the Quantitative Characteristics of the Hippocampus Using Magnetic Resonance Imaging of the Brain for the Diagnosis Alzheimer's Disease (Review of Literature and Results of Own Research)

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Abstract

The aim of the study is to analyze the known mathematical foundations, methods and algorithms for diagnosing Alzheimer's symptoms on the basis of magnetic resonance imaging (MRI). The develop a new mathematical apparatus and algorithmic support for the automated computation of hippocampal parameters as one of the most informative brain structures, make a proposal for Alzheimer's disease.

The developed approach is based on a sequential analysis of a series of magnetic resonance images of the sagittal projection, the iterative processing of each image for the purpose of automatic detection of the hippocampus and subsequent measurement of its volumetric characteristics and characteristics of the regions and structures of the brain adjacent to the hippocampus. At the final step of the proposed approach, the vector of geometric linear and volumetric parameters of the hippocampus and adjacent regions is transferred to the neural network procedure for analyzing and deciding whether the hippocampus meets the norm or the presence of signs of Alzheimer's disease.

Thus, the approach of automatic detection, calculation of parameters and formation of the assumption about the presence or absence of Alzheimer's disease, the novelty of which is a completely automatic process of calculations and decision making, is simultaneously proposed, while providing the accuracy of localization of the hippocampus and measuring its characteristics, areas used as a feature space for decision-making on the detection of a disease or health condition of the patient;

The significance of the approach being developed lies in the subsequent construction of a specialized domestic software product that allows automatic and automated analysis of MRI images of the brain in the interests of timely detection of Alzheimer's disease and instrumental evaluation of the dynamics of its development.

Key words: Automated Analysis, Magnetic Resonance Imaging, Alzheimer's Disease, Digital Imaging, Hippocampus, Quantitative Features.

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